

What is claimed is:

1. A method for manufacturing an inkjet recording head, said inkjet recording head including a plurality of nozzles, a two-dimensional array of a plurality of pressure chambers each communicating with a common ink reservoir and a corresponding one of said nozzles, a diaphragm constituting part of walls of said pressure chambers, and a plurality of piezoelectric elements coupled to said diaphragm so as to correspond to said pressure chambers, said method comprising the steps of:

temporarily bonding a piezoelectric plate onto a substrate; forming a mask having a piezoelectric element array mask pattern on said piezoelectric plate, said piezoelectric element array mask pattern includes a plurality of piezoelectric element mask patterns;

sandblasting said piezoelectric plate through said mask to thereby form a piezoelectric element array including a plurality of separate piezoelectric elements;

bonding said piezoelectric element array onto said diaphragm as a unit; and

removing said substrate from said piezoelectric element array after said sandblasting.

2. The method according to claim 1, wherein said mask additionally has a peripheral dummy mask pattern surrounding said piezoelectric element array mask pattern and/or an intervening dummy mask pattern having a portion disposed

between adjacent two of said piezoelectric element mask patterns.

3. The method according to claim 1, wherein said sandblasting step additionally forms a positioning mark on said substrate and/or said piezoelectric plate.

5 4. The method according to claim 1, wherein:
said temporarily bonding step uses a heat-foaming adhesive film; and,

said removing step includes heating said heat-foaming adhesive film.

10 5. The method according to claim 1, further comprising the step of forming an insulating resin film on side surfaces of said piezoelectric elements between said sandblasting step and said piezoelectric elements bonding step.

6. The method according to claim 1, wherein said
15 piezoelectric elements bonding step uses a conductive adhesive.

7. The method according to claim 1, wherein said sandblasting step is conducted for a time interval longer than a minimum normal processing period for penetrating said piezoelectric plate.

20 8. The method according to claim 1, wherein said sandblasting step forms a plurality of trenches between adjacent remaining portions of said piezoelectric plates, said trenches having a substantially uniform width.

9. The method according to claim 1, wherein one of
25 opposite edges of said piezoelectric element opposes a wall of

said pressure chamber and the other of said opposite edges of said piezoelectric element opposes interior of said pressure chamber.

10. The method according to claim 9, further comprising the step of mechanically and electrically connecting a flexible
5 wiring board to surfaces of said piezoelectric elements by using solder bumps.

11. A method for manufacturing an inkjet recording head, said inkjet recording head including a plurality of nozzles, a two-dimensional array of a plurality of pressure chambers each
10 communicating with a common ink reservoir and a corresponding one of said nozzles, a diaphragm constituting part of walls of said pressure chambers, and a plurality of piezoelectric elements coupled to said diaphragm so as to correspond to said pressure chambers, said method comprising the steps of:

15 forming a mask having a mask pattern on a piezoelectric plate, said mask pattern including a piezoelectric element array mask pattern and a dummy mask pattern, said piezoelectric element array mask pattern including a plurality of piezoelectric element mask patterns; and

20 sandblasting said piezoelectric plate through said mask to thereby form a piezoelectric element array including a plurality of separate piezoelectric elements and at least one dummy pattern, said dummy pattern having an edge extending adjacent to an edge of one of said piezoelectric elements.

25 12. The method according to claim 11, wherein said

dummy mask pattern includes a peripheral mask pattern surrounding said piezoelectric element array mask pattern.

13. The method according to claim 11, wherein said dummy mask pattern includes a plurality of dummy mask patterns
5 each having a portion disposed between two of said piezoelectric element mask patterns.

14. The method according to claim 11, further comprising the steps of:

temporarily bonding said piezoelectric plate onto a
10 substrate before said sandblasting step;

bonding said piezoelectric element array as a unit onto said diaphragm; and

removing said substrate from said piezoelectric element array after said sandblasting.

15 15. The method according to claim 14, wherein said sandblasting step additionally forms a positioning mark on said substrate and/or said piezoelectric plate.

16. The method according to claim 14, wherein:
said temporarily bonding step uses a heat-foaming adhesive
20 film; and,

said removing step includes heating said heat-foaming adhesive film.

17. The method according to claim 14, further comprising the step of forming an insulating resin film on side
25 surfaces of said piezoelectric elements between said sandblasting

step and said piezoelectric elements bonding step.

18. The method according to claim 14, wherein said piezoelectric elements bonding step uses a conductive adhesive.

19. The method according to claim 14, wherein said sandblasting step is conducted for a time interval longer than a minimum normal processing period for penetrating said piezoelectric plate.

20. The method according to claim 14, wherein said sandblasting step forms trenches between adjacent remaining portions of said piezoelectric plate, said trenches having a substantially uniform width.

21. The method according to claim 14, wherein one of opposite edges of said piezoelectric element opposes a wall of said pressure chamber and the other of said opposite edges of said piezoelectric element opposes interior of said pressure chamber.

22. The method according to claim 21, further comprising the step of mechanically and electrically connecting a flexible wiring board to surfaces of said piezoelectric elements by using solder bumps.

23. An inkjet recording head comprising:
a plurality of nozzles;
a two-dimensional array of a plurality of pressure chambers each communicating with a common ink reservoir and a corresponding one of said nozzles;
a diaphragm constituting part of walls of said pressure

chambers; and

a plurality of piezoelectric elements coupled to said diaphragm so as to correspond to said pressure chambers, wherein:

5 an insulating resin films are formed on side surfaces of each of said piezoelectric elements.

24. An inkjet recording head comprising:

a plurality of nozzles;

10 a two-dimensional array of a plurality of pressure chambers each communicating with a common ink reservoir and a corresponding one of said nozzles;

a diaphragm constituting part of walls of said pressure chambers;

15 a plurality of piezoelectric elements coupled to said diaphragm so as to correspond to said pressure chambers, said piezoelectric elements being arranged in a two dimensional array on said diaphragm; and

a dummy pattern made of a material same as a material of said piezoelectric elements.

20 25. The inkjet recording head according to claim 24, wherein said dummy pattern includes a peripheral pattern portion surrounding said array of said piezoelectric elements.

26. The inkjet recording head according to claim 24, wherein said dummy pattern includes an intervening pattern
25 portion disposed between each adjacent two of said piezoelectric

elements.

27. An inkjet recording head comprising:

a plurality of nozzles;

a pressure plate having therein a two-dimensional array of

5 a plurality of pressure chambers each communicating with a common ink reservoir and a corresponding one of said nozzles;

a diaphragm constituting part of walls of said pressure chambers; and

10 a piezoelectric plate having therein a plurality of piezoelectric elements coupled to said diaphragm so as to correspond to said pressure chambers, said piezoelectric elements being arranged in a two dimensional array on said diaphragm;

said pressure plate having a positioning mark, said diaphragm having a through-hole aligned with said positioning mark, said piezoelectric plate having an alignment mark.

15 28. An inkjet recording device including an inkjet recording head according to claim 23.

29. An inkjet recording device including an inkjet recording head according to claim 24.

20 30. An inkjet recording device including an inkjet recording head according to claim 27.